

CLIMATOLOGICAL DATA FOR DECEMBER, 1912.

DISTRICT No. 11, CALIFORNIA.

Prof. ALEXANDER G. MCADIE, District Editor.

GENERAL SUMMARY.

December was a cool, dry month. Like last December, there was a marked deficiency in precipitation, due chiefly to the dry period of the first decade and the absence of rain between the 18th and the 28th, except along the northern coast. The most important climatic feature of the month was the prevalence of high winds in the San Joaquin Valley and in the counties south of the Sierra Madre. Santa Ana winds prevailed December 7 and 8; also December 25 and 26.

In view of the severe loss to the citrus fruit crop of California during the last week in December, 1912, on account of high winds, and the first week of January, 1913, on account of severe cold, it may not be out of place to state here that according to conservative and reliable estimates the crop in the southern citrus belt for the season 1912-13 would be 36,000 car loads of oranges and 8,000 carloads of lemons. When these estimates were made there had been practically no damage from frost, although there had been some damage by the north winds. In addition to the above figures for southern California, there should be added the output from counties north of the Tehachapi, which would bring the grand total for the State to 48,000 carloads.

The wind storm of December 25-26, which occurred after the above estimates were made, was the worst in many years. The Southern Pacific Railroad was forced to abandon its schedule between San Bernardino and Los Angeles on Christmas Day, because of sand drifts on the main line for a distance of nearly 3 miles at Declez. On the Salt Lake line there was much delay and a large force of men were required to clear the track. Overland train No. 2, leaving Los Angeles at 8 o'clock, arrived at Riverside in $6\frac{1}{2}$ hours, although the usual running time is $2\frac{1}{2}$ hours. There was much suffering on the train and it was necessary for mothers to lay dampened handkerchiefs over the faces of their children as a protection from the sand. It is said that the wind was comparatively light at Ontario, but was high a short distance east. There are no accurate records of the velocity of the wind in this section, but it is evident that there was a strong air current through the Cajon Pass and that the surface wind carrying much sand was sufficiently strong to rock railroad cars on the track. Between Wineville and Tedley the velocity of the wind was estimated to be 60 miles an hour.

The above statements relative to weather conditions in December are of importance as showing that considerable damage must have occurred previous to the low temperatures which occurred at the end of December and the beginning of January. Heavy frosts occurred throughout the northern counties of the State December

22, 23, 24, 25, 26, 27, 28; and in the southern counties December 30 and 31. Ample warnings were issued and promptly distributed.

TEMPERATURE.

The temperature for the State was 2° below the normal. The following table gives the mean temperature for each December during the time for which records have been kept:

Years.	Mean.	Depart- ure.	Years.	Mean.	Depart- ure.
	$^{\circ}F.$	$^{\circ}F.$		$^{\circ}F.$	$^{\circ}F.$
1897.....	44.4	-2.3	1905.....	45.3	-1.4
1898.....	44.4	-2.3	1906.....	47.3	+0.6
1899.....	45.8	-0.9	1907.....	48.3	+1.6
1900.....	47.3	+0.6	1908.....	43.2	-3.5
1901.....	47.4	+0.7	1909.....	43.3	-3.4
1902.....	46.6	-0.1	1910.....	47.8	+1.1
1903.....	48.0	+1.3	1911.....	43.3	-3.4
1904.....	47.2	+0.5	1912.....	44.7	-2.0

The highest temperature reported at any station was 89° at King City on the 7th. This was 2° cooler than the highest temperature recorded during December, 1911. The lowest temperature was -6° at Tamarack on the 6th. This was 20° warmer than the lowest temperature recorded during December, 1911, at the same place.

PRECIPITATION.

The average precipitation for California for December with departures from the normal is as follows:

Years.	Mean.	Depart- ture.	Years.	Mean.	Depart- ture.
	Inches.	Inches.		Inches.	Inches.
1897.....	1.75	-1.28	1905.....	1.55	-1.48
1898.....	1.20	-1.83	1906.....	8.42	+5.39
1899.....	3.03	.00	1907.....	5.41	+2.38
1900.....	1.68	-1.35	1908.....	2.33	-.70
1901.....	1.45	-1.53	1909.....	6.92	+3.89
1902.....	2.96	-.07	1910.....	1.87	-1.46
1903.....	1.44	-.59	1911.....	2.05	-.98
1904.....	3.04	+.01	1912.....	1.58	-2.45

The greatest monthly precipitation was 15.59 inches, at Weitchpec. Forty stations reported no rain during the month.

SNOWFALL IN THE MOUNTAINS.

December, 1912, was a month of light snowfall in the mountains of California. In many ways it resembled December, 1911, as the snow cover was not extensive nor deep. The run-off during the month was exceptionally light, and at nearly all points streams were very low. While the water supply has not been abundant, there

has been no special hardship due to scarcity. The following table gives the depth of snow on the ground at Summit, Placer County, Cal.:

Years.	Dec. 1.	Dec. 15.	Dec. 31.
	Inches.	Inches.	Inches.
1907.....	0	47	87
1908.....	24	32	21
1909.....	2	24	45
1910.....	7	4	4
1911.....	1	2	56
1912.....		14	19
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SUNSHINE.

The following table gives the total hours of sunshine and percentages of the possible:

Stations.	Hours.	Percent- age of possible.	Stations.	Hours.	Percent- age of possible.
Eureka.....	75	26	Sacramento.....	215	73
Fresno.....	230	77	San Diego.....	268	86
Los Angeles.....	276	90	San Francisco.....	192	65
Mount Tamalpais.....	196	66	San Jose.....	225	75
Red Bluff.....	174	80	San Luis Obispo.....	253	85

There was more sunshine during the current December than during the same month last year.

NOTES ON THE RIVERS OF THE SACRAMENTO AND LOWER SAN JOAQUIN WATERSHEDS FOR DECEMBER, 1912.

By N. R. TAYLOR, Local Forecaster.

Sacramento watershed.—The rivers of this watershed were much below the stages usually maintained during December and were even lower than during the preceding month. In some of the reaches of the Sacramento River stages 1 foot lower than those of November were reported.

There was a marked deficiency in rainfall over all sections of the Sacramento Valley, especially in the lower portion, where the rainfall was the lightest on record for December. Rain, mostly light, was general from about the 10th to the 15th and during this period from 15 to 20 inches of snow accumulated in the high ranges of the Sierra Nevada, but the prevailing low temperatures retarded the melting of snow and likewise reduced the run-off of all mountain streams. The greatest rise in any stream during the month was 4.6 feet at Red Bluff during the 24 hours ending at 7 a. m. of the 15th, but this flattened out as it moved downstream and resulted only in a slight swell in the lower reaches of the river.

There was a scarcity of water for mining purposes during the entire month.

Lower San Joaquin watershed.—The rivers of this watershed remained at extreme low stages during the month. The San Joaquin River itself was, with one exception, the lowest of which there is a record for December. Precipitation throughout the drainage basin was light and there was no appreciable increase in the run-off of any of the mountain streams as a result of melting snow.

NOTES ON THE RIVERS OF THE UPPER SAN JOAQUIN WATER-SHED.

By W. E. BONNETT, Local Forecaster.

During the month of December there was but one general rain in the watershed of the upper San Joaquin and it was not in sufficient amount to cause any rise in the streams. The stages were very low and uniform through-

out the month with ranges at the various stations of but one or two tenths of a foot.

In many ways the weather of December was like that of the same month last year but the abnormalities were more pronounced. Fewer days with fog were recorded than ever before, the percentage of humidity was the lowest and the number of clear days the greatest of record. These conditions were brought about by the scarcity of rain and resulted in a great daily range of temperature, the day temperatures being somewhat higher than normal and the night temperatures very much lower. There was an unusual succession of heavy to killing frosts with the temperature at the ground 25° or below on 15 days of the month.

OCEAN TEMPERATURES ON CALIFORNIA COAST.

By GEORGE F. MCEWEN.

[Summary by author of a paper prepared for the University of California, Department of Zoology.]

The presence along the west coast of North America of a belt of cold surface water having at any point a much lower temperature than is normal for the corresponding latitude has long been known. And several papers have been written in which a diversity of merely qualitative explanations of this interesting and perplexing phenomenon have been given. The present paper is an attempt to explain quantitatively the temperature distribution by means of a new theory of oceanic circulation, developed by V. W. Ekman, of Kristiana.

The contents of this paper fall under the following nine heads:

I. A brief summary of some important and generally accepted facts concerning oceanic temperatures and circulation.

II. A brief review of the theories that have been proposed to account for the cold-water belt along the west coast of North America.

III. An abstract of the most important part of Ekman's theory of oceanic circulation needed in attacking the above-mentioned problems.

IV. Some general qualitative applications of his theory to a variety of temperature problems.

V. The formulation of a temperature problem in such a way that a quantitative estimate of the mean monthly surface-water temperature for any given place can be made by means of the physical theory of heat and circulation.

VI. The solution of the above problem for four very different regions along the Pacific coast, and a comparison of the observed and calculated values.

VII. A discussion of the results, and additional test of the theory using the observations made by the Marine Biological Association of San Diego in a much more limited area.

VIII. Some remarks on the influence of ocean temperatures on the coast climate of California.

IX. Summary and conclusion.

IX. SUMMARY AND CONCLUSIONS.

Numerous observations extending over a long period have established the presence of abnormally cold surface water contiguous to the west coast of North America,

¹ McEwen, Geo. F., The Distribution of Ocean Temperatures Along the West Coast of North America Deduced from Ekman's Theory of the Upwelling of Cold Water from the Adjacent Ocean Depths. Internationale Revue der gesamten Hydrobiologie und Hydrographie, 1912, Band V, Heft 2 und 3, pp. 243-286, 21 text figures, 4 tables.

